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Experimental results of the base line length definition on signals: GPS, GLONASS and GPS/GLONASS

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NAVIGATION USER EQUIPMENT GNSS GLONASS/GPS

GLONASS/GPS Personal Navigator

1. PURPOSE: Determination of current position, ground speed and course of user by GLONASS and GPS navigation signals, service tasks solutions, calculation of direction angle, waypoints and routes storage

2. CONFIGURATION:

- electronic unit with built-in navigation antenna;
- remote navigation antenna;
- charging device - power supply;
- reserve battery unit .

GLOSPACE SGK-70 Automobile Multimedia Navigator

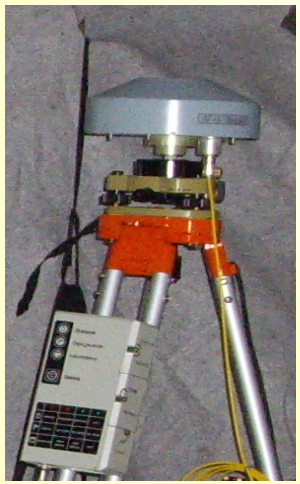
The hardware product is designed and the issue of batch production is adjusted since 2007

GLOSPACE SGK-70 is the first automobile navigator in Russia, which uses signals from GLONASS/GPS satellites.
The navigator comprises all up-to-date technological achievements: large sensor color display, map with the navigation system, special functions for street navigation {voice help, automatic routing), embedded MP3/MPEG4 player, photo viewing, viewing video from the external source, clock, graph file development/replay program control, headphone socket

The hardware product is designed and the issue of batch production is adjusted since 2008

GLOSPACE SGK-72NV is a 2-DIN system with color sensor 7" TFT LCD, TV-tuner, DVD-player (DivX), remote control, Bluetooth, equipped with GLONASS/GPS receiver

GLONASS/GPS high-precision geodetic equipment



GLOSPACE SGK-T - Satellite Navigation Automobile Tracker

The hardware product is designed and the issue of batch production is adjusted since 2008

GLOSPACE SGK-T is an automobile tracker logger which provides positioning coordinates upon the signals from GLONASS and GPS global navigation systems.
Embedded GSM and GPRS modules provides the opportunity to detect automobile coordinates and to track transport`s motions. Thus, the automobile is monitored permanently.
GLOSPACE SGK-T is intended for stationary use in cars and trucks.

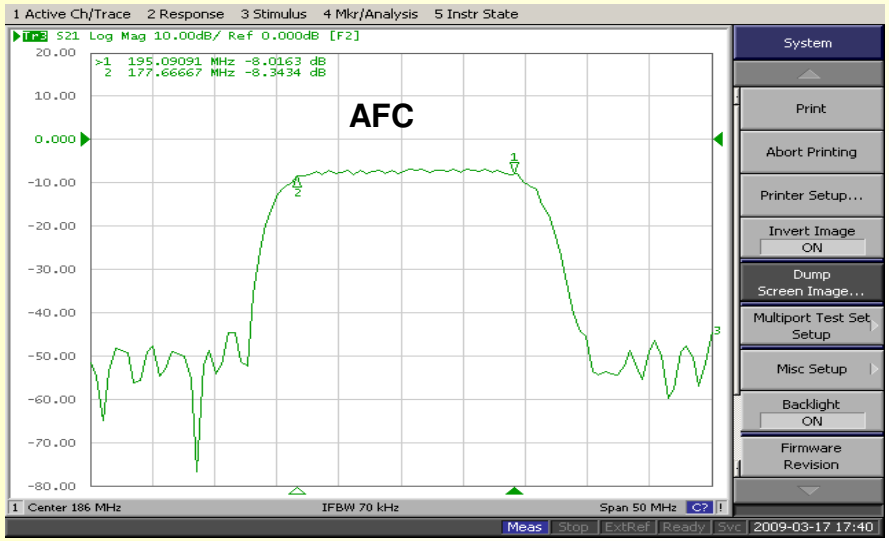
There is general opinion that the relative measurements with mm-cm accuracy are impossible in GLONASS because of frequency signal division

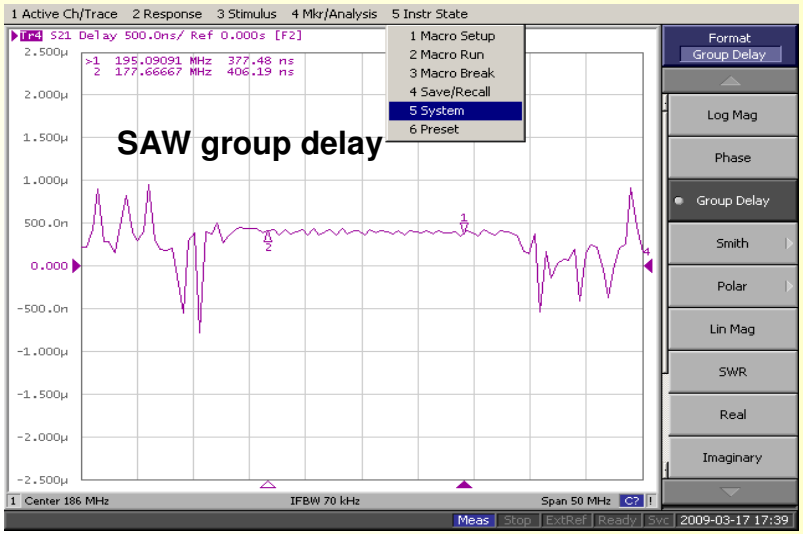
In this report the experimental data which demonstrated the potentialities of high accuracy relative determination of position in GLONASS are given

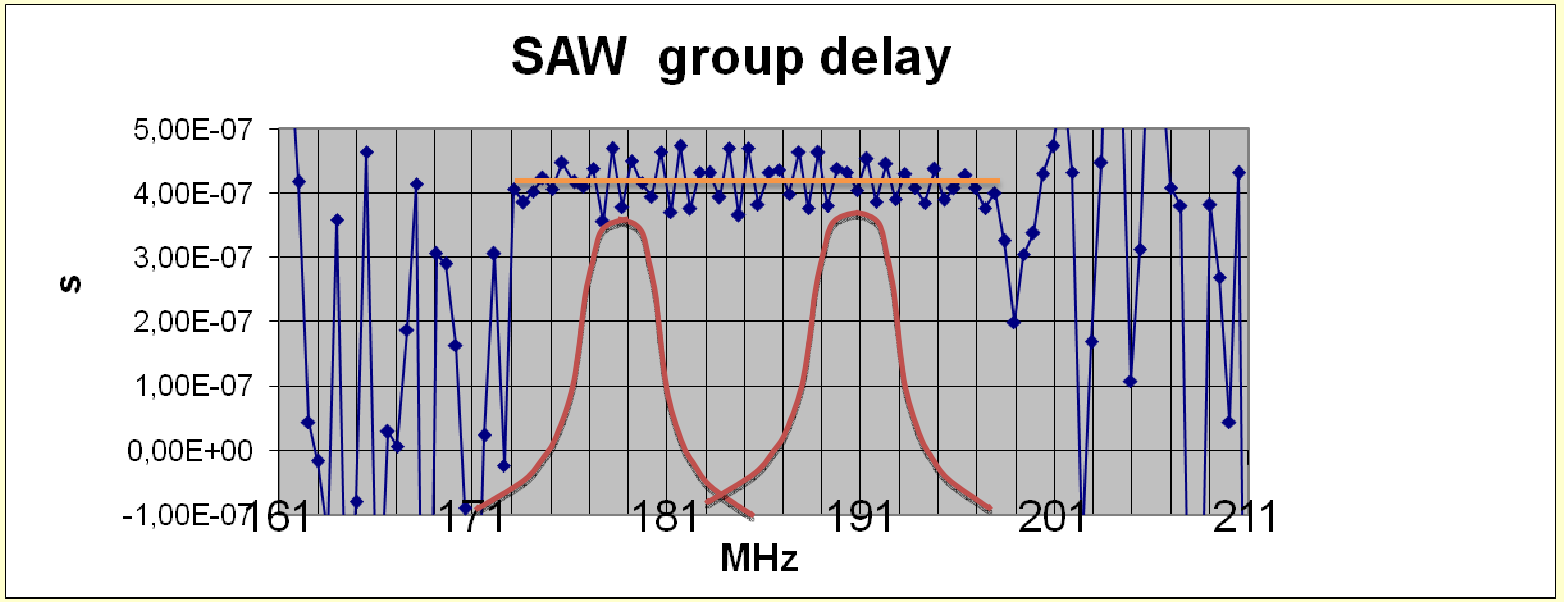
Initial data

1. Three modes of experiment: GPS, GLONASS and GPS/GLONASS
2. Signals: L1 C/A, L2C GPS, L1 SA, L2 SA GLONASS
3. Base length: from 50 m to 108 km
4. A posteriori estimate
5. Time of measurements: 1 min, 30 min, 210 min
6. Identical receivers on base's ends
7. Tropospheric model

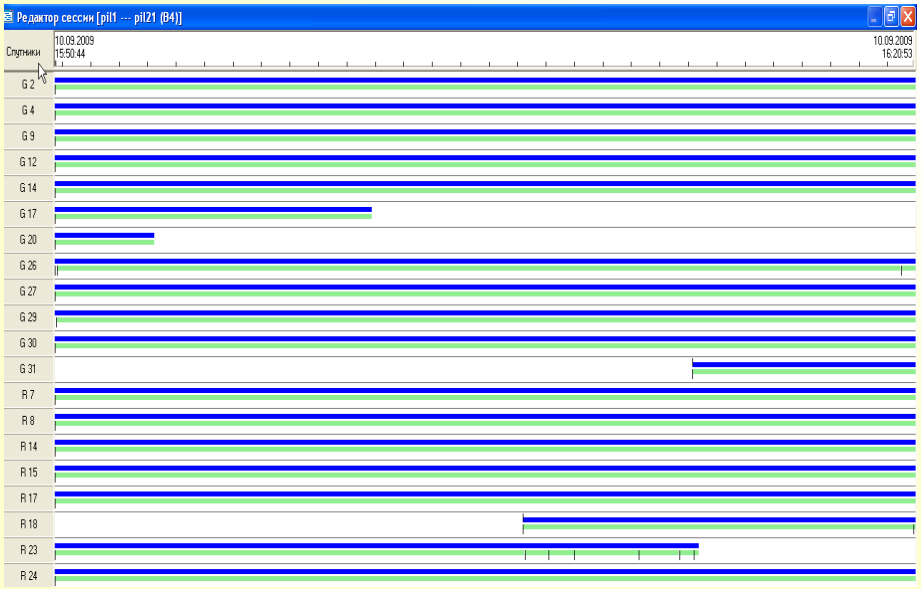
Front-end filter characteristics





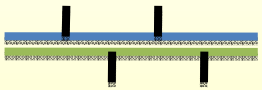


Experimental results (1)



The first station

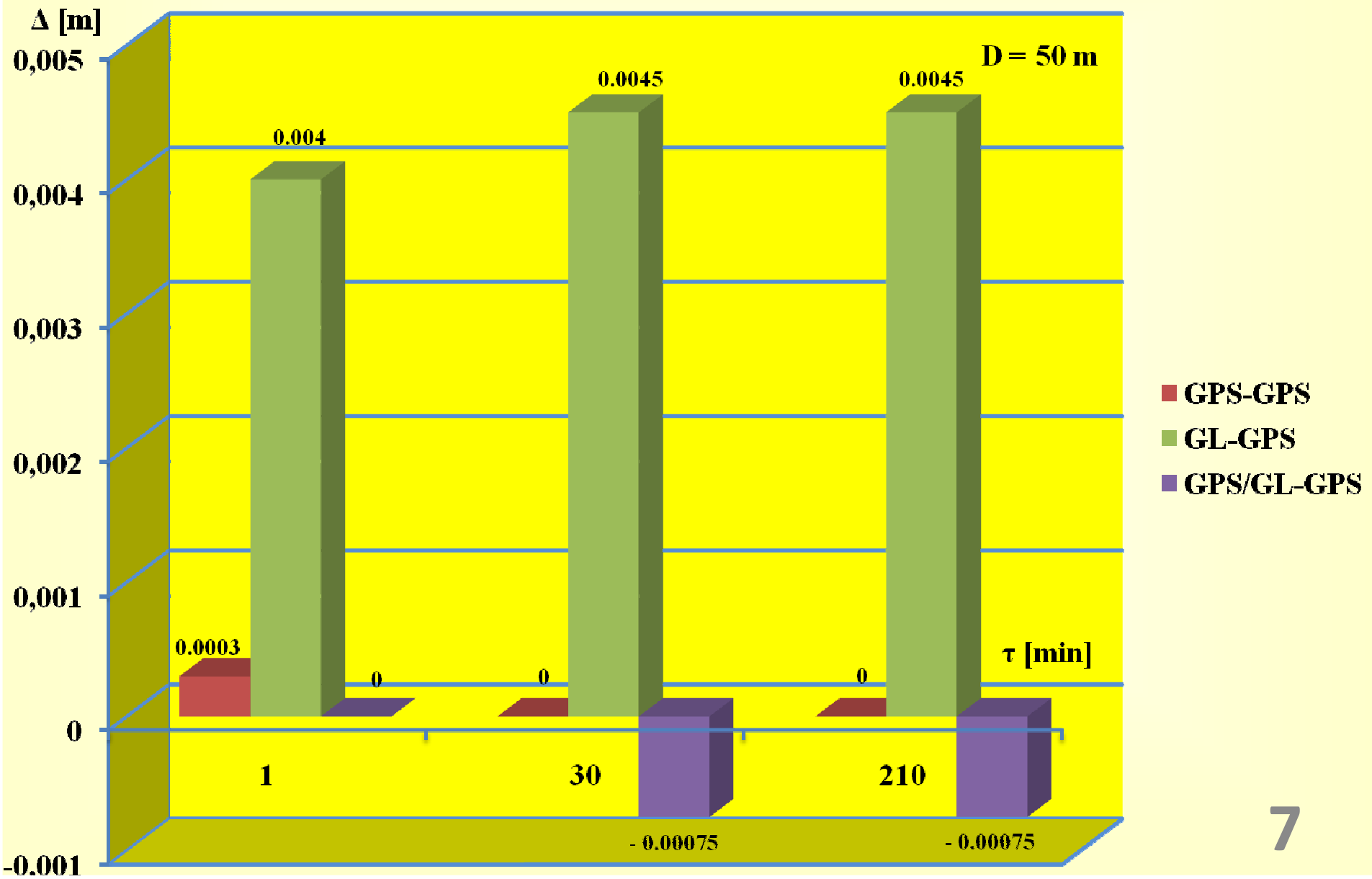
The second station



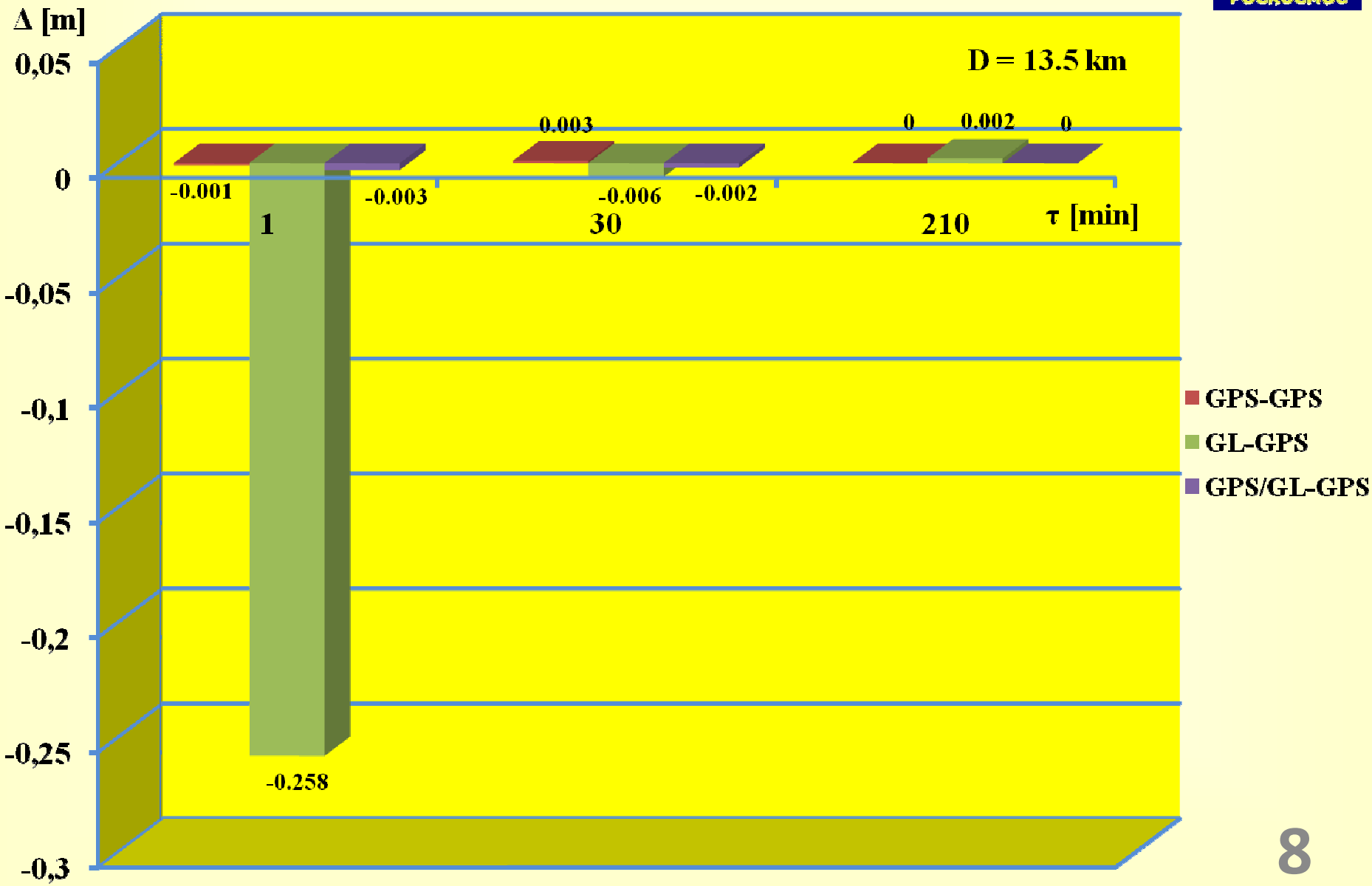
Cycle slips

G – GPS; R - GLONASS

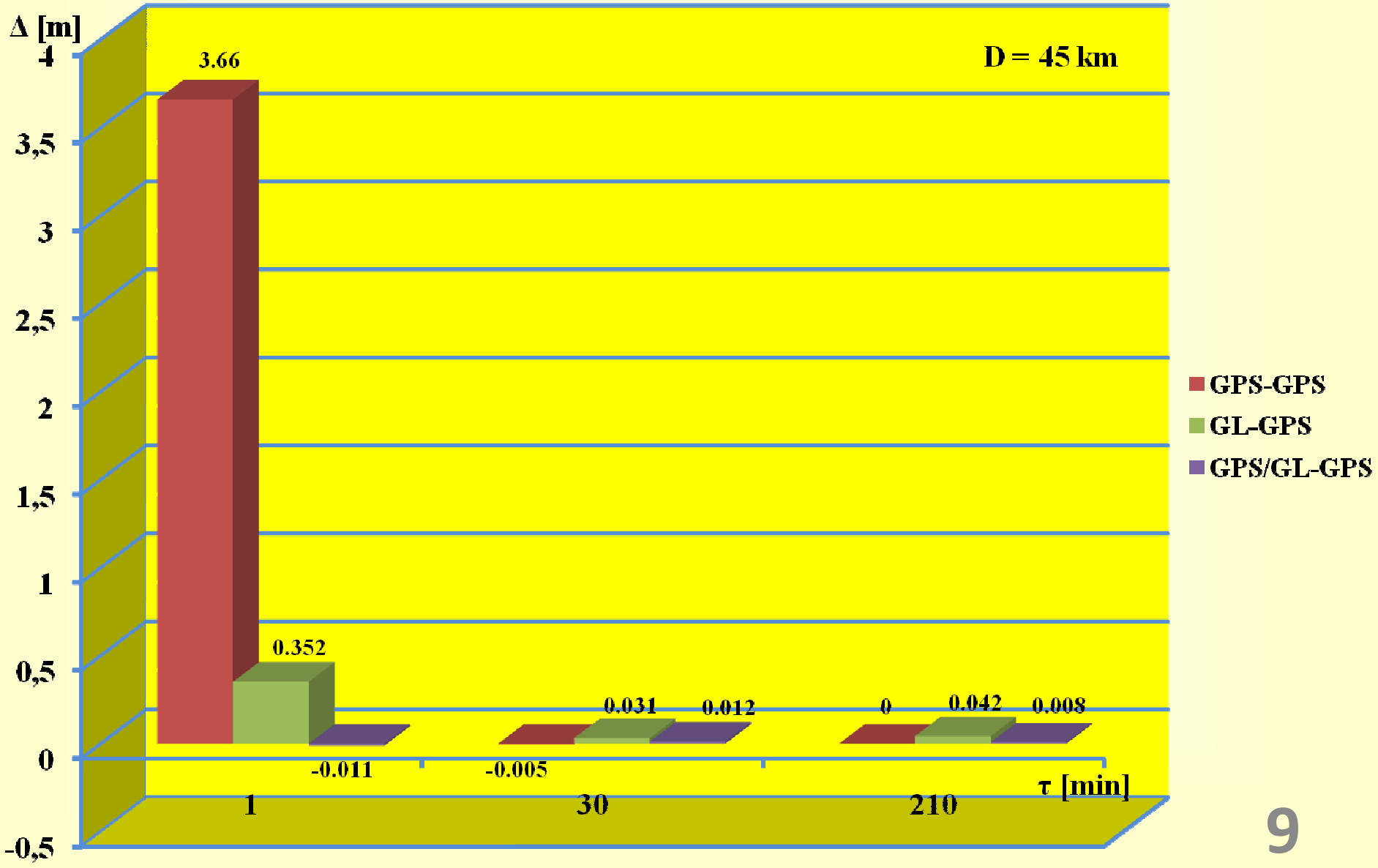
Experimental results (2)



Experimental results (3)



Experimental results (4)



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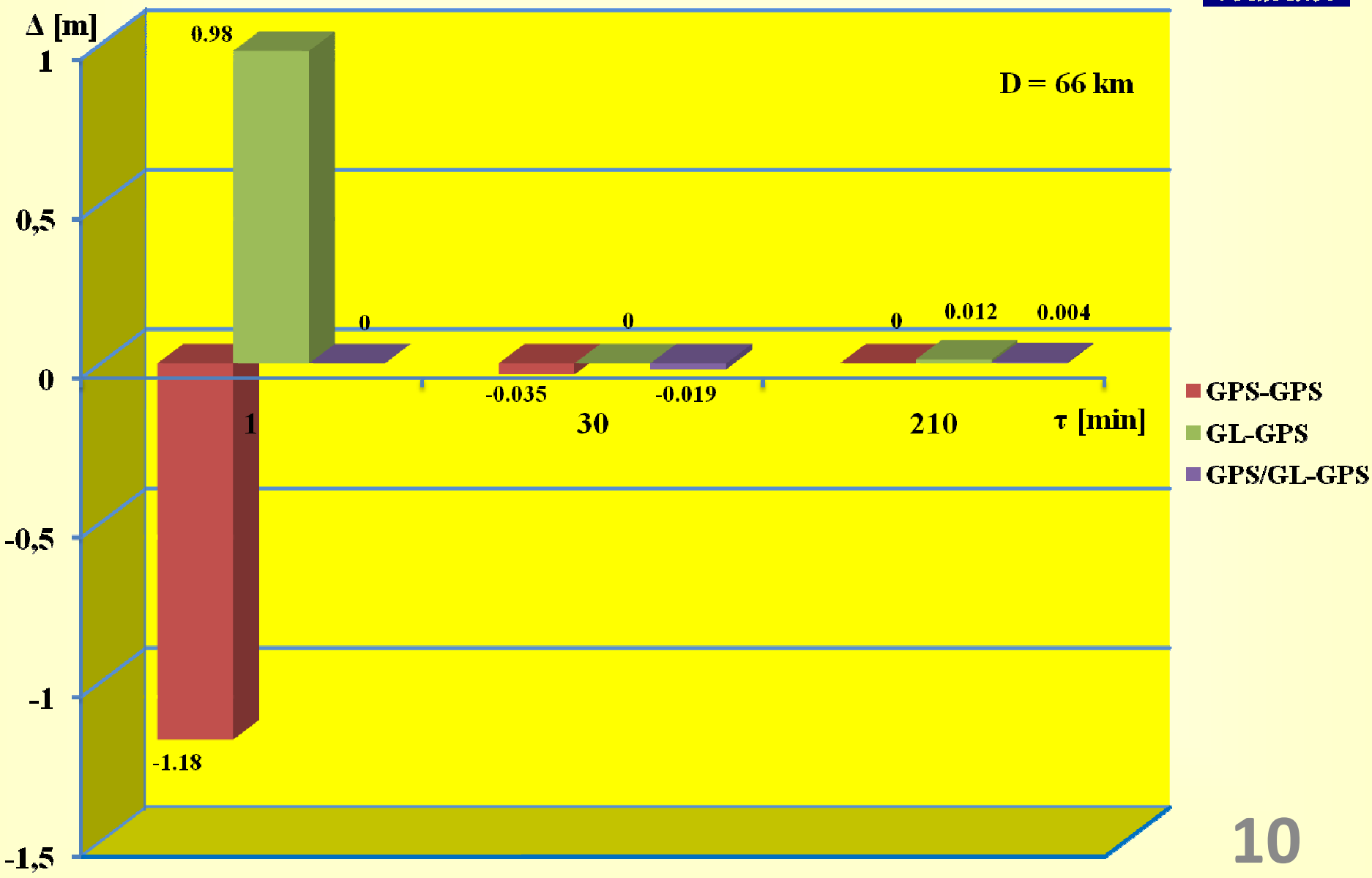
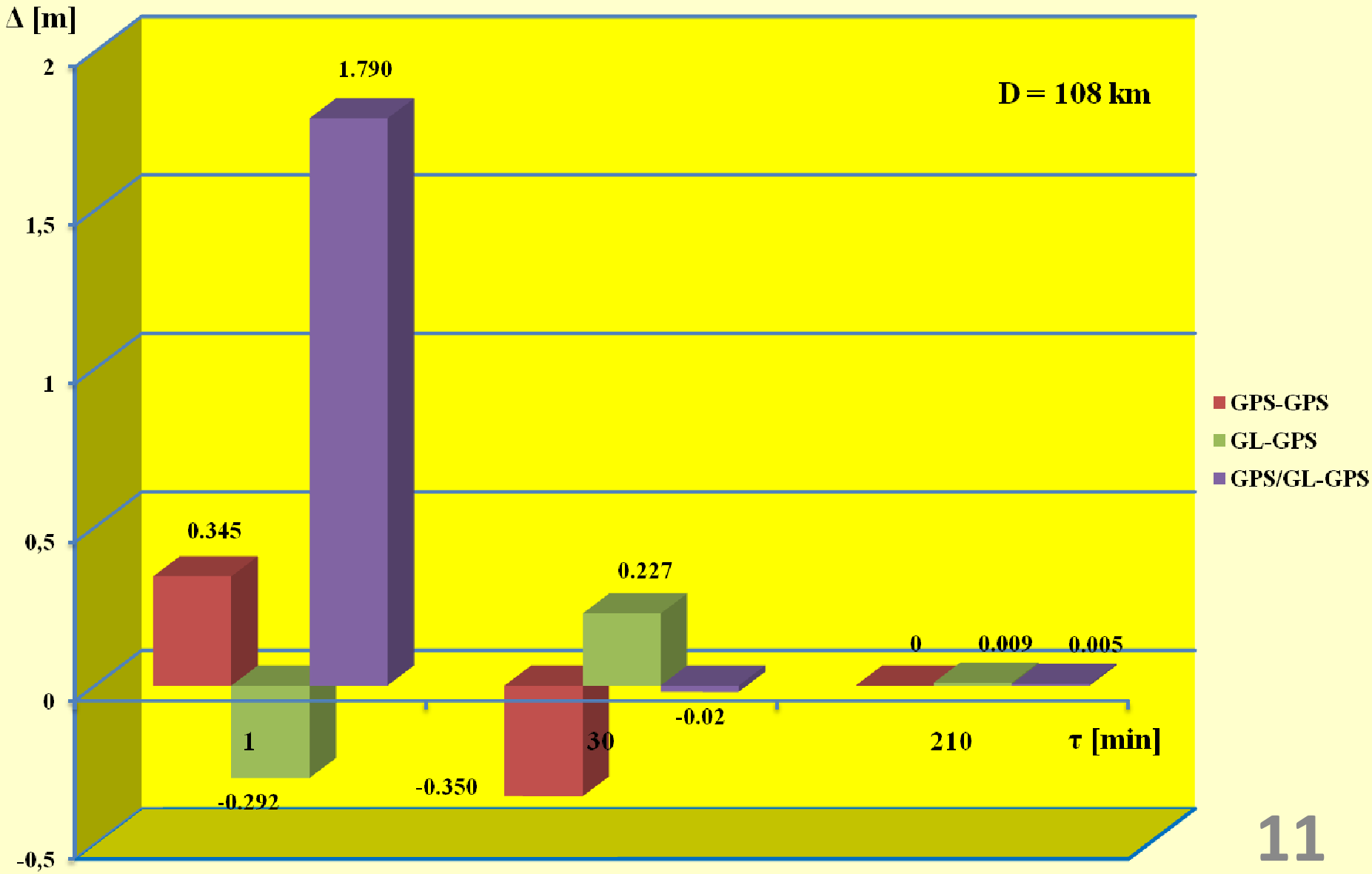
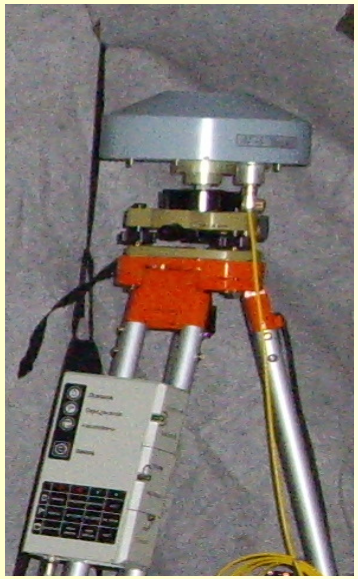


Experimental results (6)



GLONASS/GPS high-precision geodetic equipment



High-precision geodetic equipment is designed for:

- execution of survey works for geodetic networks of various purposes;
- topographical survey and design and survey works;
- database support of land cadastre and monitoring of land use;
- relative determinations of plane coordinates and altitudes

Configuration of geodetic equipment :

- navigation receiver with information storage;
- geodetic antenna with 3 m cable;
- radio modem;
- power adapter – charger;
- rechargeable battery

Navigation receiver characteristics:

- SIS – L1 C/A, L2C GPS, L1 SA, L2 SA GLONASS;
- number of channels – 64;
- frequency of coordinate updating – 1 s;
- maximum time of information storage – 7 days;
- coordinate systems – EP-90.02, WGS-84, SC-42, Gauss-Kruger projection;
- continuous operation time – up to 8 h from internal battery;
  – without limit from external power supply;
- temperature of operation – from -40^{0}C to +50^{0}C.

Summary

1. Reference decision is the decision obtained with the use of only GPS signals at observation time 210 min.

2. GLONASS signals with frequency division don't preclude from high accuracy (mm – cm) relative determination of position

3. Appropriate filter characteristics are required

4. Practically the decision for combined GPS/GLONASS constellation offered the advantage both the decision speed and the accuracy (difference don't exceed 2 cm)

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Thank you for your attention!